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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/028,712	12/28/2001	Masahiro Furusawa	111604	3933

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EXAMINER
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MARKHAM, WESLEY D

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 04/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/028,712

**Applicant(s)**

FURUSAWA ET AL.

**Examiner**

Wesley D Markham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 17-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2001 and 17 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Acknowledgement is made of the amendment filed by the applicant on 2/17/2004, in which the specification of the instant application was amended, one sheet of corrected formal drawings was submitted, Claims 1 – 16 were canceled, and Claim 19 was amended. Claims 17 – 20 are currently pending in U.S. Application Serial No. 10/028,712, and an Office Action on the merits follows.

### ***Drawings***

2. The one (1) sheet of formal drawings filed by the applicant on 2/17/2004 has been received by the Office and is approved by the examiner. As such, the objection to the drawings (set forth in paragraph 4 of the previous Office Action, mailed on 11/18/2003) is withdrawn.

### ***Specification***

3. The objections to the specification, set forth in paragraph 6 of the previous Office Action, are withdrawn in light of the applicant's amendment filed on 2/17/2004.
4. The disclosure is objected to because of the following informalities: The paragraph ending on page 17, line 13, of the specification and submitted by the applicant with the amendment of 2/17/2004 appears to contain a typographical error. Specifically, it appears that the reference character "30B" is a typographical error and should read

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"30b" in order to correctly correspond with Figure 2 of the instant application.

Appropriate correction is required.

### ***Claim Objections***

5. The objection to Claims 5, 12, and 19, set forth in paragraph 7 of the previous Office Action, is withdrawn in light of the applicant's amendment in which Claims 5 and 12 were canceled, and Claim 19 was amended to correctly spell "halogen".

### ***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. The rejection of Claims 8, 11 – 13, and 15 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, set forth in paragraphs 9 – 12 of the previous Office Action, is withdrawn in light of the applicant's amendment in which the aforementioned claims were canceled.
8. Claims 19 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. **Claim 19** requires, in part, that, "said step of forming an active region and inactive region for CVD comprises: a step of...forming a self-assembled film on said thin-film-forming surface..." However, independent Claim 17 (from which Claim 19 depends) only recites and requires that the active region and inactive region for CVD be formed on the liquid arranging surface. No mention is made of forming an active region and inactive region for CVD on the thin-film-forming surface, which is set facing the liquid arranging surface in Claim 17. Therefore, the limitation in Claim 19 that, "said step of forming an active region and inactive region for CVD comprises: a step of...forming a self-assembled film on said thin-film-forming surface..." does not have proper antecedent basis in the claims, and it is unclear whether the applicant intends to claim that (1) the self-assembled film (i.e., used to form the active and inactive regions for CVD) is formed on the liquid arranging surface, or (2) an active region and inactive region for CVD are also formed on the thin-film-forming surface, in addition to the liquid arranging surface, and forming such regions on the thin-film-forming surface comprises forming a self-assembled film. As such, the scope of Claim 19 (and **Claim 20** which depends from it) is unclear, and the claims are vague and indefinite. For the purposes of examination only, the examiner has reasonably interpreted Claims 19 and 20 to require that, "said step of forming an active region and inactive region for CVD comprises: a step of...forming a self-assembled film on said liquid arranging surface..."

***Claim Observations***

10. Please note that the 35 USC 102 and 103 rejections set forth in paragraphs 13 – 27 of the previous Office Action are withdrawn in light of the applicant's amendment in which Claims 1 – 16 were canceled.

***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Furusawa et al. (US 2002/0114887 A1) (newly discovered and cited) in view of either the applicant's admitted prior art (AAPA) or Ping (USPN 6,235,605 B1), and

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Sharp Corp (JP 2000-012465 A). As such, the allowable subject matter set forth in paragraphs 28 and 29 of the previous Office Action is withdrawn.

14. Regarding **Claim 17**, Furusawa et al. teaches a method of forming a thin-film in a pattern (paragraph [0001]), the method comprising a step of forming on one or more parts of a liquid arranging surface (i.e., first substrate "8" in Figure 4) an active region and inactive region for CVD (i.e., a monolayer pattern) (paragraph [0071]), a step of arranging on the liquid arranging surface liquid silane compounds used in a CVD process in general and comprising silicon and hydrogen (Figure 4, reference number "5"; paragraphs [0040], [0041], and [0063]), a step of arranging a thin-film-forming surface of a second substrate (i.e., second substrate "7" in Figure 4) to be set facing the liquid arranging surface of the first substrate "8" (Figures 4(a) – (c); paragraph [0064]), and a step of vaporizing the liquid material from the liquid arranged on the liquid arranging surface of the first substrate and supplying the material to the thin-film-forming surface of the second substrate to selectively deposit a thin-film (Figures 4(b) and (c); paragraphs [0065] – [0071]). Furusawa et al. does not explicitly teach that (1) the method is used to form a silicon thin film, and (2) the liquid contains a silicide comprising a ring silane and/or a derivative thereof, the ring silane comprising silicon and hydrogen. However, Furusawa et al. is generally concerned with forming a patterned silicon film (see paragraphs [0010] – [0013]) and teaches that the liquid containing the raw material for the thin film can be any known liquid material that is used in a CVD process in general, for example liquid silane compounds such as pentasilane and hexasilane (paragraphs [0040] –

[0041]). Both the AAPA and Ping teach that, in some applications, it is desirable to selectively deposit a silicon thin-film in a pattern on a substrate (page 1, third full paragraph of the applicant's specification; and Col.1, lines 51 – 67, and Col.2, lines 60 – 64 of Ping). Additionally, Sharp Corp teaches a method of forming a silicon thin-film (Abstract) which comprises a step of arranging in one or more parts of a liquid arranging surface liquid which contains a silicide comprising a ring silane and/or a derivative thereof, the ring silane comprising silicon and hydrogen (e.g., cyclopentasilane – CPS) (paragraph [0019]), and a step of forming the silicon thin-film by vaporizing silicide from the liquid and supplying the silicide to a thin-film forming surface (Abstract, Figure 1, and paragraphs [0012] – [0015], [0019] – [0034], [0046] – [0053], and [0060] – [0070]). In other words, Sharp Corp teaches that a ring silane compound such as CPS is a liquid material that can be successfully vaporized and deposited by CVD to form a silicon film on a substrate. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the method of Furusawa et al. to form a patterned silicon thin film because Furusawa et al., the AAPA, and Ping all teach that, in some cases, it is desirable to selectively deposit a silicon thin-film in a pattern on a substrate, and the method of Furusawa et al. is capable of forming such a patterned film while advantageously (1) using a small amount of raw material liquid, and (2) eliminating the need for a separate patterning step after the formation of the thin film (paragraph [0013]). Additionally, it would have been obvious to one of ordinary skill in the art to utilize a ring silane such as CPS (as taught by Sharp Corp) as the liquid silane compound in the process of Furusawa et al. with the reasonable



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expectation of successfully and advantageously using a known species (i.e., CPS) out of the broader genus of liquid silane compounds generally taught by Furusawa et al. In doing so, one of ordinary skill in the art would have reasonably expected to achieve similar results (i.e., successfully depositing a patterned silicon film), regardless of which specific liquid silane compound (e.g., pentasilane, as taught by Furusawa et al., or cyclopentasilane, as taught by Sharp Corp) was used as the precursor / film-forming material in the process. Regarding **Claims 19 and 20**, Furusawa et al. also teaches that the step of forming an active region and inactive region for CVD comprises a step of, where R is a fluoroalkyl group in which hydrogen on an end side of an alkyl group is substituted with fluorine and X is an alkoxy group or a halogen group, forming a self-assembled film on the liquid arranging surface (and the thin-film-forming surface) on which a hydroxyl group exists, using a silane derivative having the general formula  $\text{RSiX}_3$ , and performing a physical treatment, specifically UV ray irradiation through a photomask or electron beam irradiation to a necessary part, of the self-assembled film to remove a part of the self-assembled film which becomes an active region for CVD, in order to form an active region and inactive region for CVD (paragraphs [0030] – [0037], [0052] – [0058], [0062], and [0071]).

15. Claim 18 is rejected under 35 U.S.C. 103(a) as being obvious over Furusawa et al.

(US 2002/0114887 A1) in view of either the applicant's admitted prior art (AAPA) or Ping (USPN 6,235,605 B1), and Sharp Corp (JP 2000-012465 A), in further view of

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Furusawa et al. (WO00/59044 A1). Please note that USPN 6,518,087 B1 (i.e., the 371 / National Stage Application corresponding to document WO00/59044 A1) is being used as an effective English-language translation of the WO00/59044 A1 document, which was published in Japanese.

16. The combination of Furusawa et al., either the AAPA or Ping, and Sharp Corp teaches all the limitations of **Claim 18** as set forth above in paragraph 14, except for a method wherein a solution in which cyclopentasilane (CPS) and/or silylcyclopentasilane (SCPS) are/is dissolved in an organic solvent is used as the liquid. However, the aforementioned combination of references does teach that CPS can be utilized as the liquid in the silicon film deposition process (see paragraph 14 above) and that such a compound can be included in "various mixtures" (paragraph [0019] of Sharp Corp). Furusawa et al. '59044 teaches that it was known in the art of depositing silicon films at the time of the applicant's invention to dissolve compounds such as CPS and SCPS in an organic solvent such as a hydrocarbon in order to obtain a coating solution that has an appropriate viscosity (i.e., not too low so that coating is difficult to perform, and not so high so that it is difficult to obtain a coating film having a smooth surface) (Col.5, lines 21 – 22, and Col.9, lines 1 – 58). Therefore, it would have been obvious to one of ordinary skill in the art to utilize a solution in which cyclopentasilane (CPS) and/or silylcyclopentasilane (SCPS) are/is dissolved in an organic solvent in the process of the combination of Furusawa et al., either the AAPA or Ping, and Sharp Corp with the reasonable expectation of (1) success, as Sharp Corp does teach that CPS can be utilized as the liquid in the

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silicon film deposition process and that such a compound can be included in "various mixtures", and Furusawa et al. '59044 teaches that ring silane compounds are soluble in organic (i.e., hydrocarbon) solvents, and (2) obtaining the benefits of adding a solvent to the CPS liquid, such as the ability to tailor the viscosity of the solution so that the liquid can be deposited easily and uniformly.

17. Importantly, please note that the newly applied reference (i.e., Furusawa et al. – US 2002/0114887 A1) has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference (i.e., 12/27/2001, as opposed to 12/28/2001 for the instant application), it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the

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invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

18. Additionally, please note that the applicant cannot rely upon the foreign priority papers (i.e., Japanese Application 2000-402809, filed 12/28/2000) to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15. However, if such a translation is provided and fully supports the subject matter of Claims 17 – 20 of the instant application, the rejections set forth in paragraphs 13 – 16 of this Office Action will be withdrawn.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
WDM

Wesley D Markham  
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